Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently Amended) A manufacturing method of a semiconductor device comprising:

forming a laminate layer comprising a lower first conductive layer and an upper second conductive layer over a semiconductor layer with a gate insulating film interposed between the semiconductor layer and the conductive layers;

forming a mask pattern over the laminate layer;

forming a first conductive layer pattern having a tapered edge by etching the second conductive layer and the first conductive layer;

after forming the first conductive layer pattern, recessing an edge of the mask pattern remaining on the first conductive layer pattern;

after recessing the edge of the mask pattern, forming a second conductive layer pattern by selectively etching the second conductive layer in the first conductive layer pattern in accordance with the recessed mask pattern using a processing step different from a processing step used to recess the edge of the mask pattern remaining on the first conductive layer pattern; and

forming an LDD region in a region of the semiconductor layer overlapping with the first conductive layer in the second conductive layer pattern by using the second conductive layer in the second conductive layer pattern as a mask for shielding ions accelerated by an electric field.

2. (Original) The method according to claim 1, wherein the first conductive layer is made of tungsten, and the second conductive layer is made of aluminum or metal having aluminum as the main component.

3. (Original) The method according to claim 1, wherein the edge of the mask pattern remaining on the first conductive layer pattern is recessed by oxygen plasma treatment.

4. (Currently Amended) A manufacturing method of a semiconductor device comprising:

forming a laminate layer over a semiconductor layer by sequentially depositing a first conductive layer, a second conductive layer, and a third conductive layer with a gate insulating film interposed between the semiconductor layer and the conductive layers;

forming a mask pattern on the laminate layer;

forming a first conductive layer pattern having a tapered edge;

after forming the first conductive layer pattern, recessing an edge of the mask pattern remaining on the first conductive layer pattern;

after recessing the edge of the mask pattern, forming a second conductive layer pattern by selectively etching the third conductive layer and the second conductive layer in the first conductive layer pattern in accordance with the recessed mask pattern using a processing step different from a processing step used to recess the edge of the mask pattern remaining on the first conductive layer pattern; and

forming an LDD region in a region of the semiconductor layer overlapping with the first conductive layer in the second conductive layer pattern by using the third conductive layer and the second conductive layer in the second conductive layer pattern as a mask for shielding ions accelerated by an electric field.

5. (Original) The method according to claim 4, wherein the first conductive layer is made of tungsten, the second conductive layer is made of aluminum or alloy or compound having aluminum as the main component, and the third conductive layer is made of titanium nitride.

6. (Original) The method according to claim 4, wherein the edge of the mask pattern remaining on the first conductive layer pattern is recessed by oxygen plasma treatment.

7. (Previously Presented) A manufacturing method of a semiconductor device comprising:

forming a laminate layer comprising a lower first conductive layer and an upper second conductive layer over a semiconductor layer with a gate insulating film interposed between the semiconductor layer and the conductive layers;

forming a mask pattern on the laminate layer;

decreasing a taper angle of an edge of the mask pattern by performing plasma treatment;

after decreasing the taper angle, forming a first conductive layer pattern having a tapered edge by etching the second conductive layer and the first conductive layer of the laminate layer by using the mask pattern;

after forming the first conductive layer pattern, forming a second conductive layer pattern by selectively etching the second conductive layer in the first conductive layer pattern; and

forming an LDD region in a region of the semiconductor layer overlapping with the first conductive layer in the second conductive layer pattern by using the second conductive layer in the second conductive layer pattern as a mask for shielding ions accelerated by an electric field.

8. (Original) The method according to claim 7, wherein the first conductive layer is made of tungsten, and the second conductive layer is made of aluminum or metal having aluminum as the main component.

9. (Original) The method according to claim 7, wherein the edge of the mask pattern remaining on the first conductive layer pattern is recessed by oxygen plasma treatment.

10. (Currently amended) The method according to claim 7, wherein [[the]] a width of the mask pattern is decreased by plasma treatment using a fluorine-based gas.

11. (Previously Presented) A manufacturing method of a semiconductor device comprising:

forming a laminate layer over a semiconductor layer by sequentially depositing a first conductive layer, a second conductive layer, and a third conductive layer with a gate insulating film interposed between the semiconductor layer and the conductive layers;

forming a mask pattern on the laminate layer;

etching the third conductive layer and decreasing taper angle of an edge of the mask pattern by performing plasma treatment;

after etching the third conductive layer and decreasing the taper angle, forming a first conductive layer pattern having a tapered edge by etching the second conductive layer and the first conductive layer of the laminate layer by using the mask pattern;

after forming the first conductive layer pattern, forming a second conductive layer pattern by selectively etching the second and third conductive layers in the first conductive layer pattern; and

forming an LDD region in a region of the semiconductor layer overlapping with the first conductive layer in the second conductive layer pattern by using the second and third conductive layers in the second conductive layer pattern as a mask for shielding ions accelerated by an electric field.

12. (Original) The method according to claim 11, wherein the edge of the mask pattern remaining on the first conductive layer pattern is recessed by oxygen plasma treatment.

13. (Currently amended) The method according to claim 11, wherein [[the]] a width of the mask pattern is decreased by plasma treatment using a fluorine-based gas.

14. (New) The method according to claim 11, wherein the first conductive layer is made of tungsten, the second conductive layer is made of aluminum or an alloy or compound having aluminum as the main component, and the third conductive layer is made of titanium nitride.

15. (New) A manufacturing method of a semiconductor device comprising:

forming a laminate layer comprising a lower first conductive layer and an upper second conductive layer over a semiconductor layer with a gate insulating film interposed between the semiconductor layer and the conductive layers;

forming a first shaped mask pattern over the laminate layer;

forming a first conductive layer pattern having a tapered edge and a second shaped mask pattern by etching the second conductive layer and the first conductive layer;

removing a portion of the second shaped mask pattern remaining on the first conductive layer pattern to form a third shaped mask pattern;

forming a second conductive layer pattern by selectively etching the second conductive layer in the first conductive layer pattern in accordance with the third shaped mask pattern using a processing step different from a processing step used to form the third shaped mask pattern; and

forming an LDD region in a region of the semiconductor layer overlapping with the first conductive layer in the second conductive layer pattern by using the second conductive layer in the second conductive layer pattern as a mask for shielding ions accelerated by an electric field.

16. (New) The method according to claim 15, wherein the first conductive layer is made of tungsten, and the second conductive layer is made of aluminum or metal having aluminum as the main component.

17. (New) A manufacturing method of a semiconductor device comprising:

forming a laminate layer over a semiconductor layer by sequentially depositing a first conductive layer, a second conductive layer, and a third conductive layer with a gate insulating film interposed between the semiconductor layer and the conductive layers;

forming a first shaped mask pattern over the laminate layer;

forming a first conductive layer pattern having a tapered edge and a second shaped mask pattern by etching the third conductive layer, the second conductive layer and the first conductive layer;

removing a portion of the second shaped mask pattern remaining on the first conductive layer pattern to form a third shaped mask pattern;

forming a second conductive layer pattern by selectively etching the third conductive layer and the second conductive layer in the first conductive layer pattern in accordance with the third shaped mask pattern using a processing step different from a processing step used to form the third shaped mask pattern; and

forming an LDD region in a region of the semiconductor layer overlapping with the first conductive layer in the second conductive layer pattern by using the third conductive layer and the second conductive layer in the second conductive layer pattern as a mask for shielding ions accelerated by an electric field.

18. (New) The method according to claim 17, wherein the first conductive layer is made of tungsten, the second conductive layer is made of aluminum or an alloy or compound having aluminum as the main component, and the third conductive layer is made of titanium nitride.